cloud droplets, ice crystals, dust, and fluorescent particles are shown. The sampler has been used in both airborne and ground installations.

D. L. LAMAR (The Rand Corporation, Santa Monica, Calif.), *Optical Ellipticity and Internal Structure of Mars.* The optically determined values of the ellipticity of Mars are more than double the values determined from the motion of the Martian satellites. It is assumed that the optical ellipticity refers to the actual shape of the solid surface of the planet and that the topographically high equatorial region is compensated isostatically by a suitable distribution of crustal thickness. Consideration of the effect of this isostatically compensated equatorial bulge on the gravity field of Mars, as determined by motion of the Martian satellites, leads to the following conclusions: (1) The depth of compensation cannot be greater than about 226 km. (2) We have not been justified in saying that Mars has a more homogeneous distribution of material than the earth, and it is possible that Mars has a core. If the conditions controlling the depth to the base of the crust in the earth and Mars are similar, the large amount of crustal material required for compensation of the proposed Martian equatorial bulge is more easily explained if the base of the crust represents a change in phase from basalt to ecologite, rather than a change in chemical composition.

MARVIN LANPHERE AND G. J. WASSERBURG (Division of Geological Sciences, California Institute of Technology, Pasadena), *Age Measurements of the Precambrian Rocks of the Death Valley–Mojave Desert Region, California.* Ar^{40}-K^{40} and Sr^{87}-Rb^{87} age measurements in the eastern Mojave Desert indicate two separate early Precambrian events (see table). The older event is approximately 1650 m.y. old and is evidenced by pegmatites and associated metamorphic rocks in the Mountain Pass district. Ages were measured on coarse muscovite and potassium feldspar, MP-1 and MP-2, from a pegmatite which cuts across biotite-bearing gneisses, MP-7 and MP-9. These data confirm the widespread areal extent of this ancient metamorphic terrane. Ages of biotite, MP-21 and MP-22, from the shonkinite, which intrudes the metamorphic rocks, at Mountain Pass and the Rb-Sr age of potassium feldspar, MM-3*f*, from granite in the Marble Mountains suggest a period of igneous intrusion in the 1350 to 1410 m.y. interval. Metamorphic rocks in the central Panamint Range have been mapped and are shown to be stratigraphically early Precambrian. K-Ar ages of approximately 80 m.y. have been measured on biotite, muscovite, and hornblende. The minerals show no memory of a Precambrian age. The early Precambrian rocks show no evidence of a younger period of metamorphism. However, a younger metamorphism can be recognized in the overlying Precambrian(?) Noonday dolomite and Johnnie formation.

Specimen	Age, m.y.	
	K-Ar	Rb-Sr
MP-1 (musc., peg.)	1660	1640
MP-2 (K-spar., peg.)		1600
MP-7 (bio., gn.)	1560	1460
MP-9 (bio., gn.)	1580	1520
MP-21 (bio., shonk.)		1410
MP-22 (bio., shonk.)	1380	1410
MM-3*b* (bio., gr.)	1190	1225
MM-3*f* (K-spar., gr.)	970	1350

D. LEDENT (Université Libre de Bruxelles, Brussels, Belgium), C. C. PATTERSON (California Institute of Technology, Pasadena), AND G. R. TILTON (Carnegie Institution of Washington, Geophysical Laboratory, Washington, D. C.), *Ages of Zircon and Feldspar Concentrates from North American Beach and River Sands.* The ratio of old to young zircon has been compared with the age and relative proportions of triclinic and monoclinic K feldspar in two river sands and two beach sand composites. The following interpretations have been made. (*a*) West Coast beach sands: 90% of K feldspar and 80% of zircon derived from Cretaceous batholiths; 10% of K feldspar derived from metamorphics of about Cretaceous age; 20% of zircon derived from rocks with average age of 1600 m.y. (*b*) East Coast beach sands: 20% of K feldspar and 50% of zircon derived from Appalachian plutons of about 350 m.y.; 80% of K feldspar derived from metamorphics of same age; 50% of zircon derived from rocks with average age of 1500 m.y. (*c*) Upper Mississippi River sand: 10% of K feldspar and 35% of zircon derived from plutons with average age of 1000 m.y.; 90% of K feldspar derived from metamorphics with an average age of 1900 m.y.; 65% of zircon derived from plutons with average age of 2800 m.y. (*d*) Mississippi River delta sand: approximately a one-to-one mixture of sands represented by the upper Mississippi River sample and the West Coast beach composite, except that the plutonic sources in the latter component may be somewhat older than Cretaceous.

J. E. LOKKEN, J. A. SHAND, AND C. S. WRIGHT (Pacific Naval Laboratory, Defence Research Board of Canada, Esquimalt, B. C.), *Evidence of Conjugate Relationship in Micropulsations.* Observations made at Byrd Station, Antarctica, and at Great Whale River and Churchill, Canada, show that micropulsations of an impulsive nature occur simultaneously at conjugate locations in the auroral zones. The character of these activity bursts and their times of commencement at nonconjugate stations separated by as little as 1000 km are markedly different. These events are often accompanied by active auroral displays, and it is likely